

## CHAPTER 43 SCHOOL BUSES

[Prior to 8/10/88, see Public Instruction Department [670]Ch 23]

**281—44.1(285) Requirements for manufacturers.** In order to protect both the boards of education and distributors from misunderstanding and confusion, all manufacturers shall provide equipment meeting both federal and Iowa construction requirements herein described.

Federal safety standards applicable to school bus construction are contained in Federal Motor Vehicle Safety Standards and Regulations; With Amendments and Interpretations, 1980, United States Government Printing Office, Superintendent of Documents, Washington, D.C. 20402. These include but are not limited to the following:

- 101 — Control location, identification, and illumination.
- 102 — Transmission shift lever sequence, starter interlock, and transmission braking effect.
- 103 — Windshield defrosting and defogging systems.
- 104 — Windshield wiping and washing systems.
- 105 — Hydraulic braking systems.
- 106 — Brake hoses.
- 107 — Reflecting surfaces.
- 108 — Lamps, reflective devices, and associated equipment.
- 109 — New pneumatic tires.
- 110 — Tire selection and rims.
- 111 — Rearview mirrors.
- 113-2— Hood latch systems.
- 116 — Motor vehicle brake fluids.
- 119 — New pneumatic tires for vehicles other than passenger cars.
- 120 — Tire selection and rims for motor vehicles other than passenger cars.
- 121 — Air brake systems.
- 124 — Accelerator control systems.
- 205 — Glazing materials.
- 206 — Door locks and door retention components.
- 207 — Seating systems.
- 208 — Occupant crash protection.
- 209 — Seat belt assemblies.
- 210 — Seat belt assembly anchorages.
- 217 — Bus window retention and release.
- 219 — Windshield zone intrusion for vehicles with a GVWR of 10,000 pounds or less.
- 220 — School bus rollover protection.
- 221 — School bus body joint strength.
- 222 — School bus passenger seating and crash protection.
- 301 — Fuel system integrity.
- 302 — Flammability of interior materials.

As found in "Federal Motor Vehicle Safety Standards and Regulations; With Amendments and Interpretations," U.S. Department of Transportation, National Highway Traffic Safety Administration, Washington, D.C. 20590, U.S. Government Printing Office.

### **281—44.2(285) School bus chassis.**

**44.2(1) Air cleaner.** School bus shall be equipped with an air cleaner properly installed to meet engine specifications and mounted outside the passenger compartment.

#### **44.2(2) Alternator.**

*a.* All chassis greater than 10,000 pounds GVWR (gross vehicle weight rating) shall be equipped with an alternator which will produce a minimum of 40 amperes at 1,500 RPM alternator rotor speed, and 100 amperes at 4,500 RPM alternator rotor speed.

b. All chassis of 10,000 pounds GVWR or less shall, as a minimum, be equipped with an alternator equal to or exceeding 80 amperes. The alternator shall be capable of producing a minimum of 40 amperes at 1,500 RPM alternator rotor speed, and 80 amperes at 4,500 RPM alternator rotor speed.

c. Alternator shall be ventilated and voltage controlled.

d. Belt drive shall be capable of handling the rated capacity of the alternator with no detrimental effect on other driven components.

**44.2(3) Axles.**

a. Front axle shall have gross weight capacity at the ground according to the chassis manufacturer's rating, equal to or exceeding that portion of the total load which is supported by the front axle.

b. The rear axle shall be full-floating and have a gross weight capacity at the ground according to the chassis manufacturer's rating, equal to or exceeding that portion of the total load which is supported by the rear axle. Axle shall be equipped with a magnetic drain plug.

**44.2(4) Battery system.**

a. The storage battery system, as established by the manufacturer's rating, shall be of sufficient capacity to efficiently care for the starting, lighting signal devices, heating, defrosting, and other electrical equipment. The battery shall be temporarily mounted on the chassis frame by the chassis manufacturer. Appropriate cable lengths shall be in accordance with School Bus Manufacturers Institute, Design Objectives Booklet, January 1985. Battery cables shall be constructed of number two or larger copper cable.

EXCEPTION: Rear engine vehicles and vehicles of 10,000 pounds GVWR or less may have battery(ies) mounted as per chassis manufacturer's standard location.

b. A 12-volt battery system tested at 0 degrees Fahrenheit shall be provided which meets or exceeds the following capacity ratings:

(1) Gasoline engines (greater than 10,000 pounds GVWR): 150 minutes reserve and 500 cold cranking ampere capacity.

(2) Gasoline engines (10,000 pounds GVWR or less): 125 minutes reserve and 450 cold cranking ampere capacity.

(3) Diesel engines (all): 200 minutes reserve and 1,000 cold cranking ampere capacity, or a cold cranking ampere capacity not less than the engine manufacturer's minimum requirements, whichever is greater.

**44.2(5) Brakes.**

a. All chassis shall be equipped with a braking system meeting federal requirements at date of manufacture.

b. Every brake system shall be equipped with warning signals, readily recognizable to the driver should either the primary or secondary braking component of the system experience a malfunction or failure. The system shall produce a continuous warning when:

(1) The air pressure available in the system for braking is 60 psi (pounds per square inch) or less.

(2) The vacuum in the system available for braking is eight inches of mercury or less.

c. Buses using a hydraulic assist brake system shall be equipped with warning signals, readily audible and visible to the driver, that will provide continuous warning in the event of a loss of fluid flow from primary source or loss of electric source powering the back-up system.

d. All brake lines and booster assist lines shall be protected from excessive heat, corrosion and vibration and be installed to prevent chafing.

e. Reservoirs required. Every brake system which employs air or vacuum shall include a reservoir of the following capacity, where applicable, for brake operation:

(1) Air brake system shall have reservoir capacity meeting federal requirements at date of manufacture.

(2) Braking systems which employ vacuum as an assist or as a primary or secondary source shall have a reservoir used exclusively for brakes that shall be adequate to ensure loss in vacuum pressure at full stroke application of not more than 30 percent with the engine not running.

Connection for auxiliary accessory reservoir. The brake system shall include suitable and convenient connection for the installation of an auxiliary air or vacuum reservoir by the body manufacturer.

*f.* Check valve required. All brake system reservoirs shall be protected by a check valve or equivalent device to prevent depletion of the air or vacuum reservoir should a failure or leak develop between the reservoir and source of compressed air or vacuum.

*g.* An air brake system is required on every chassis meeting one or more of the following criteria:

(1) Wheelbase equal to or greater than 274 inches.

(2) Finished vehicle capacity rating greater than 66 passengers.

*h.* The air brake system, when required, shall comply with the following system and component designs:

(1) Cannot be of wedge design.

(2) Shall include an air dryer system, approved by the department of education, having design features equal to or exceeding the Bendix Westinghouse Model AD4. The system shall be self-purging and capable of removing oil, dirt, and moisture. The dryer system shall also be equipped with a heater to prevent the freezing of moisture within the system. All plumbing from air compressor to input of air dryer or after-cooler shall be done to provide soft flow bends not producing sumps in air compressor line having direct entry into dryer. Automatic moisture ejector or "spitter valve" does not meet the above requirement.

(3) Air compressor shall produce a minimum output of 12.0 cubic feet per minute (CFM).

*i.* Vehicles 10,000 pounds GVWR or less shall be equipped with a hydraulic, dual braking system of manufacturer's standard, with power assist.

*j.* Brakes, parking. Parking brake system shall be designed and constructed to meet all federal requirements at date of manufacture in addition to the following:

(1) All chassis, except those equipped with a spring-activated parking brake, shall be equipped with orschelin or equivalent hand brake. The parking brake shall be easily accessible and operable from the driver's seat.

EXCEPTION: Vehicles 10,000 pounds GVWR or less may be equipped with manufacturer's standard parking brake.

(2) Buses equipped with air brakes shall be equipped with a spring-activated emergency braking system.

**44.2(6) Bumper, front.** Front bumper, when furnished by the chassis manufacturer as part of the chassis, shall meet the following requirements:

*a.* Front bumper must be black in color, be pressed steel channel at least 3/16-inch thick, heavy-duty, and shall be of sufficient strength to permit pushing a vehicle of equal gross vehicle weight without permanent distortion to bumper, chassis, or body. Bumper or bumper brackets shall be bolted to chassis frame so it can be conveniently removed for maintenance.

*b.* Front bumper shall extend beyond forward-most part of body, grille, hood, and fenders (flush mounted bumpers not acceptable), and shall extend to outer edges of fenders at bumper top line (to ensure maximum fender protection). The bumper shall be curved, beveled, or have other design features at each end to prevent snagging and hooking.

*c.* On transit vehicles the front bumper shall be a minimum of nine inches wide (high).

*d.* On vehicles of 10,000 pounds GVWR or less, front bumper shall be of manufacturer's standard construction.

**44.2(7) Bumper, rear.** A rear bumper of manufacturer's standard construction shall be provided by the chassis manufacturer on all vehicles of 10,000 pounds GVWR or less having an overall body width of less than 80 inches. The bumper shall be chrome plated or painted glossy black in color matching Federal Standard 595a, color 17038.

**44.2(8) Clutch.**

*a.* All chassis greater than 10,000 pounds GVWR having manual transmission shall be equipped with a heavy-duty, asbestos-free clutch with a diameter not less than 12 inches and a capacity equal to or greater than the engine torque output.

*b.* All chassis of 10,000 pounds GVWR or less having manual transmission shall be equipped with a clutch of manufacturer's standard.

**44.2(9) Color.** The chassis, including wheels; permanently attached exterior accessories, including painted mirror surfaces; and, front bumper shall be glossy black, matching Federal Standard 595a, color 17038. The hood, cowl, and fenders shall be National School Bus Glossy Yellow, matching Federal Standards 595a, color 13432. Exceptions permitted as follows:

- a. Wheels to be black except for cast spoke rim which may be gray or black.
- b. Hood may be painted low luster yellow to reduce sun glare. Hoods painted black are not acceptable.
- c. Chrome plated, glossy black, or glossy yellow grilles are acceptable.
- d. On vehicles 10,000 pounds GVWR or less and having an overall body width of 80 inches or less, the bumpers may be either chrome plated or painted black.

**44.2(10) Defroster.** Vehicles 10,000 pounds GVWR or less, see subrule 44.3(8).

**44.2(11) Drive shaft.**

- a. Each drive shaft in the driveline shall be protected by a metal guard or guards to prevent it from whipping through the floor or dropping to the ground if broken.
- b. All carrier bearings shall have an inner race that failure of the bearings shall not damage the drive shaft.

**44.2(12) Electrical system.** See subrule 44.2(38), "Wiring."

**44.2(13) Exhaust system.**

- a. Exhaust pipe, muffler, and tailpipe shall be attached to the chassis.
- b. The tailpipe shall be constructed of seamless or electrically welded tubing of 16-gauge aluminized steel or equivalent. (Flexible exhaust tubing is not acceptable unless installed or provided by the original equipment manufacturer as a part of its vehicle design.)
- c. On chassis greater than 10,000 pounds GVWR, a tailpipe shall be installed or provided which will:
  - (1) Extend at least to the vertical line of the rear end of the body but not beyond the rear bumper. The tailpipe shall be located to either the right or left of the rear emergency exit.
  - (2) Exhaust systems may extend to, but not beyond, the body limits on the left side behind the driver's compartment, outboard of chassis center line, and shall extend a minimum of 18 inches rearward from the muffler before a maximum bend of 45 degrees is made in the pipe. There shall be a downspout attached at the end of the exhaust pipe which directs exhaust fumes towards the ground. The downspout shall not extend beyond the body skirt.
- d. The size of the tailpipe shall not be reduced after it leaves the muffler.
- e. Exhaust system shall be properly insulated from the fuel tank and the tank connections.
- f. Muffler shall be constructed of aluminized or equivalent corrosion resistant material on both the inside and outside surfaces.
- g. Noise level shall meet federal requirements as of date of manufacture.
- h. On chassis of 10,000 pounds GVWR or less, exhaust system shall be of manufacturer's standard.
- i. The patching of any damaged or worn exhaust system to avoid replacement is prohibited. Welding of the exhaust system is permissible when approved by the department of education.

**44.2(14) Fenders, front.** Does not apply to transit and metropolitan vehicles.

- a. Total spread of outer edges of front fenders, measured at fender line, shall exceed total spread of front tires when front wheels are in straight-ahead position.
- b. Front fenders shall be properly braced and free from any body attachment.  
EXCEPTION: Does not apply to vehicles 10,000 pounds GVWR or less.
- c. Chassis sheet metal shall not extend beyond rear face of cowl.
- d. Fiberglass tilt hood and front fenders are acceptable.

**44.2(15) Frame.**

- a. Frame or equivalent shall have design and strength characteristics corresponding at least to standard practice for trucks of same general load characteristics which are used for severe service.

b. When frame side members are used they shall be of one-piece construction. If frame side members are extended, the extension shall be designed and furnished by chassis or body manufacturer with their guarantee. Installation shall be made either by the chassis or body manufacturer and guaranteed by company making installation. Extensions of frame lengths are permissible only when alterations are behind rear hanger of rear spring or in front of front hanger of front spring, and shall not be for the purpose of extending wheelbase. Any manufacturer using a frame modification shall provide documentation that it meets all federal standards and school bus manufacturer's institute standards. The manufacturer shall provide a warranty to replace any defects in workmanship or materials resulting from the modification at the expense of the ultimate body manufacturer.

c. Holes in top or bottom flanges of frame siderail shall not be permitted except as provided in original chassis frame. There shall be no welding to frame siderail except by chassis or body manufacturer.

d. Frame lengths shall be provided in accordance with SBMI Design Objectives, January 1985 Edition.

**44.2(16) Fuel system.**

a. All fuel tanks, fuel tank filler pipes, and fuel tank connections shall conform to all federal standards at date of manufacture and be installed in accordance with SBMI Design Objectives, January 1985 Edition.

b. On chassis greater than 10,000 pounds GVWR, the tank shall conform to Motor Carrier Safety Regulations Section 393.67, paragraphs (c) through (f) with reference to: material and method of construction; leak testing and certification.

c. Forty-eight capacity buses with 189-inch and greater wheelbase shall be equipped with a 60-gallon fuel tank. On buses less than 48 capacity and less than 189-inch wheelbase, a fuel tank of at least 30 gallons shall be provided. All fuel tanks shall be mounted directly to the chassis frame, filled, and vented outside of the passenger compartment.

EXCEPTION: Vehicles 10,000 pounds GVWR or less, tank shall have a minimum capacity of 21 gallons.

d. Fuel tank, fittings or lines, shall not extend above top of chassis frame rail.

e. Fuel filtration shall be accomplished by means of the following:

(1) Gasoline powered systems—one in-line fuel filter shall be installed between the fuel tank and engine. This is in addition to the carburetor fuel filter element.

(2) Diesel powered systems—one in-line, spin-on fuel filter shall be provided and installed between the fuel tank and engine. In addition to the above, an in-line water/fuel separator shall be installed between the fuel tank and the secondary spin-on filter.

All filtering devices shall be accessible for maintenance or replacement.

f. The manufacturer may, on vehicles constructed for transporting special education pupils and which are to be equipped with a wheelchair lift, mount the fuel tank on the left chassis rail or behind rear wheels.

g. Additional tanks shall meet all requirements of Section 393.67.

**44.2(17) Fuels, alternate.**

a. Every alternate engine fuel system, including liquefied petroleum gas (LPG) or compressed natural gas (CNG), installed on a school bus in this state shall meet applicable federal standards, rules of the Iowa state fire marshal, and all safety specifications set forth in Pamphlet Number 58, National Fire Protection Association Incorporated (NFPA), Batterymarch Park, Quincy, MA 02269.

b. The conversion to an alternate engine fuel shall not result in the alteration of any vehicle component which would result in its noncompliance with "Federal Motor Vehicle Safety Standards and Regulations; With Amendments and Interpretations," U.S. Department of Transportation, National Highway Traffic Safety Administration, Washington, D.C. 20590.

c. Before a vehicle converted to use either LPG or CNG as an engine fuel is allowed to transport students, the superintendent of schools shall require that the installer of the alternate fuel system sign a form, designed by the department of education, certifying that the installation complies with all applicable requirements. The form shall be placed in the vehicle at all times.

**44.2(18) Governor.**

- a. Engine governor is permissible and, where used, shall be set at manufacturer's recommended maximum engine speed. When it is desired to limit road speed, road speed governor shall be installed.
- b. When engine is remotely located from driver, governor shall be installed to limit engine speed to maximum revolutions per minute recommended by engine manufacturer, or tachometer shall be installed so engine speed may be known to driver.

**44.2(19) Heating system.** The chassis engine shall have plugged openings for the purpose of supplying hot water for the bus heating system. The opening shall be suitable for attaching 3/4-inch pipe thread/hose connector.

EXCEPTION: Vehicles 10,000 pounds GVWR or less, chassis manufacturer shall provide fresh air front heater and defroster or recirculating hot water type. See subrules 44.3(8) and 44.3(15).

**44.2(20) Headlamps.** Chassis shall be equipped with a minimum of two sealed beam headlamps of proper intensity and fuses or circuit breakers. The headlamp switch shall be of adequate ampere capacity to carry the load of the clearance and identification lamps in addition to the head and tail lamps since these will be activated by one and the same switch. There shall be a manually operated switch for selection of high or low beam distribution of the headlamps.

**44.2(21) Horn.** Chassis shall be equipped with dual horns of standard make. Each horn must be capable of producing complex sound in band of audiofrequencies between approximately 250 and 2,000 cycles per second and tested per Society of Automotive Engineers Standard J377.

**44.2(22) Instruments and instrument panel.** Chassis shall be equipped with instruments and gauges as follows: (Lights in lieu of gauges are not acceptable except as noted.)

- a. Speedometer and odometer.
- b. Voltmeter with graduated scale.
- c. Oil pressure gauge.
- d. Water temperature gauge.
- e. Fuel gauge.
- f. Upper beam headlamp and turn signal indicators.
- g. Air pressure or vacuum gauge, where air or vacuum brakes are used.

EXCEPTION: Light indicator in lieu of gauge permitted on vehicles equipped with hydraulic over hydraulic brake system.

- h. All instruments shall be easily accessible for maintenance and repair.
- i. Above instruments and gauges shall be mounted on instrument panel so each is clearly visible to driver in normal seated position in accordance with SBMI Design Objectives, January 1985 Edition.
- j. Instrument panel shall have rheostatically controlled lamps of sufficient candlepower to illuminate all instruments, gauges, and shift selector indicator for automatic transmission.

**44.2(23) Mirrors.** Vehicles 10,000 pounds GVWR or less. Two exterior clearview mirrors, meeting federal requirements, shall be provided, one to the left and one to the right of driver. Area of each mirror shall not be less than 50 square inches.

**44.2(24) Oil filter.** Oil filter with replaceable element or cartridge shall be provided and shall be connected by flexible oil lines if it is not of built-in or engine-mounted design. Oil filter shall have oil capacity of at least one quart.

EXCEPTION: Vehicles 10,000 pounds GVWR or less, oil filter capacity shall be of manufacturer's standard.

**44.2(25) Openings.** All openings in floorboard or fire wall between chassis and passenger-carrying compartment shall be sealed. See subrule 44.3(7).

**44.2(26) Seat belt for driver (vehicles 10,000 pounds GVWR or less).** A safety restraint system for the driver shall be provided which conforms to federal standards at date of manufacture. The restraint system shall be equipped with a "protective" boot(s) and a retractor(s) attachment for keeping the belt off the bus floor. The protector boot(s) shall be securely anchored so it remains in an upright position at all times.

**44.2(27) Shock absorbers.** Bus shall be equipped with front and rear double acting shock absorbers compatible with manufacturer's rated axle capacity.

**44.2(28) *Sun shield.*** Vehicles 10,000 pounds GVWR or less, manufacturer's standard.

**44.2(29) *Springs.***

a. Springs or suspension assemblies shall be commensurate with chassis manufacturer's gross vehicle weight rating, of ample resiliency under all load conditions, and of adequate strength to sustain the loaded bus without evidence of overload.

b. If rear springs are used, they shall be progressive or variable rate.

c. If leaf-type front springs are used, stationary eyes shall be protected by full wrapper leaf in addition to main leaf.

d. Wrapper leaves on rear springs are permissible.

**44.2(30) *Steering gear.***

a. All school bus chassis shall be equipped with heavy-duty integral truck-like power steering with integral valves. Power steering components shall be compatible with the GVW rating for each capacity as shown in the chassis manufacturer's literature.

b. Steering mechanism shall be approved by chassis manufacturer and designed to ensure safe and accurate performance when vehicle is operated with maximum load and at maximum speed.

c. Steering mechanism shall provide for easy lubrication (when required) of all wear points and adjustment for lost motion.

d. No changes shall be made in steering apparatus which are not approved by chassis manufacturer. (Spinners or knobs on steering wheel are prohibited.)

e. There shall be clearance of at least two inches between steering wheel and cowl instrument panel, windshield, or other surface.

f. Tilt steering wheels are acceptable.

**44.2(31) *Tires and rims.***

a. All tires and rims on a given vehicle shall be of grade level 100 or better and shall conform to all federal requirements at date of manufacture.

b. Tires shall be of tubeless, steel belted, radial (standard or low profile) construction on all new school bus chassis.

c. Total weight imposed on any tire, including the body, chassis, and passenger load, shall not exceed the maximum load range and ply rating recommended by the tire manufacturer.

d. Dual rear tires shall be provided on all vehicles in excess of 80 inches in overall body width.

e. All tires on a given axle shall be of the same size (circumference) and load range.

f. Spare tires are not required; however, if specified, shall be located outside passenger compartment. The spare tire may not be attached to any part of the rear portion of the body including emergency door or bumper.

g. Recapped tires are permissible as replacements on equipment now in operation for use on rear wheels only providing tires are guaranteed by the seller. Recapped tires are not permissible where single rear wheels are used.

h. Tires, when measured on any two or more adjacent tread grooves, shall have a tread groove pattern depth of at least 4/32 of an inch on the front wheels and 2/32 of an inch on the rear wheels. No measurement shall be made where tire bars, humps, or fillets are located.

On vehicles of 10,000 pounds GVWR or less with single front and rear wheels, the tread groove pattern depth shall be at least 4/32 of an inch.

Where specific measurement points are provided by the tire manufacturer, they shall be utilized in determining tires approved for service. This requirement also applies to buses now in service.

**44.2(32) *Tow hooks.***

a. When chassis manufacturer supplies the front bumper, there shall be provided two heavy-duty tow hooks adequately secured to the front end of the frame rails but shall not project beyond the front bumper.

b. On vehicles 10,000 pounds GVWR or less, two front tow hooks are to be provided which are adequate for towing the vehicle.

**44.2(33) Transmission.**

a. Automatic transmissions shall provide for not less than three forward speeds and one reverse speed. The shift lever, if applicable, shall provide a detent between each gear position when the gear selector quadrant and shift lever are not steering column mounted.

b. If a manual transmission is used, it shall be synchromesh, except the first and reverse gears. Its design shall provide not less than four forward and one reverse speeds.

c. If a manual transmission is used, it is recommended that 53 and larger capacity buses be equipped with 5-speed transmission with a single rear axle, or a 4- or 5-speed transmission with a 2-speed rear axle. Where 5-speed transmission is required, the fifth speed shall be direct drive.

**44.2(34) Ventilation (vehicles 10,000 pounds GVWR or less).** Chassis shall be equipped with suitable, controlled ventilating system of sufficient capacity to maintain proper quantity of air under operating conditions without opening of windows except in extremely warm weather.

**44.2(35) Undercoating.**

a. Chassis manufacturer or dealer shall coat undersides of exposed metal front fenders and fender extensions with rustproofing compound for which compound manufacturer has issued notarized certification of compliance to chassis builder that compound meets or exceeds all performance and qualitative requirements of paragraph 3.4 of Federal Specification TT-C-520b, using modified test.

b. For vehicles 10,000 pounds GVWR or less, see subrule 44.3(41).

c. See subrule 44.3(45), Wheelhousings.

**44.2(36) Windshield washer.** On vehicles 10,000 pounds GVWR or less, wet arm electric windshield washers shall be provided by the chassis manufacturer.

**44.2(37) Windshield wipers.** Vehicles 10,000 pounds GVWR or less.

a. Windshield wipers shall be controlled by single or dual 2-speed or variable speed electric motor(s) meeting federal requirements at date of manufacture.

b. Wiper control(s) shall be located within easy reach of the driver and designed, when in stop position, to move blades from the driver's direct view.

c. Wiper blades and arms shall be heavy duty and of manufacturer's standard length for the vehicle.

**44.2(38) Wiring.**

a. All wiring shall conform to current applicable recommended practices of the Society of Automotive Engineers.

b. All wiring shall use a color or number coding system. A wiring diagram shall be provided that coincides with the wiring of the chassis.

c. Chassis manufacturer shall install a readily accessible terminal strip or plug on the body side of the cowl, or at an accessible location in the engine compartment of vehicles designed without a cowl, that shall contain the following terminals for the body connections:

- (1) Main 100-amp body circuit.
- (2) Tail lamps.
- (3) Right turn signal.
- (4) Left turn signal.
- (5) Stop lamps.
- (6) Backup lamps.
- (7) Instrument panel lights (rheostat controlled by headlamp switch).

d. Vehicles 10,000 pounds GVWR or less, see also subrule 44.3(49).

**281—44.3(285) School bus body.****44.3(1) Aisle.**

a. All aisle clearance shall conform to federal requirements as of date of manufacture.

b. Minimum clearance of the aisle from the front service entrance to the rear emergency exit shall be 12 inches. The seat backs shall be slanted sufficiently to give aisle clearance of 15 inches at tops of seat backs.

c. No seat or other object(s) shall be placed in the bus at any time to restrict any part of the passageway leading to the rear emergency exit, service door, or on vehicles equipped for transporting the handicapped, the special service door. See subrule 44.4(2), paragraph "m."

**44.3(2) Backup warning alarm.** Automatic, audible backup warning alarm system is permissible, however, not required. If installed, it shall comply with Society of Automotive Engineers published Backup Alarm Standards (SAE9946) specifying 97 + 4dBA for rubber tired vehicles.

**44.3(3) Battery compartment (vehicles greater than 10,000 pounds GVWR).**

a. Batteries shall be furnished by the chassis manufacturer.

b. Slide-out tray. The body manufacturer shall securely attach the battery(ies) on a slide-out tray having the minimum dimensions of 22 inches wide by 13 inches deep. Battery tray shall have a safety stop to prevent dropping battery(ies) at outer extremity of tray travel.

c. Battery compartment in body skirt. The slide-out tray shall be enclosed in a vented compartment in the body skirt. The compartment shall have the following design features:

(1) Be designed and constructed of heavy-gauge materials and be capable of carrying a total battery weight of 125 pounds without distortion or failure under school bus route conditions. The manufacturer shall provide a minimum five-year warranty against distortion or failure of a battery compartment.

(2) Have minimum dimensions of 23 inches wide, 14 inches deep, and 10 inches high.

(3) The top surface area of the inside of the battery compartment (the area likely to come into contact with battery electrical terminals as the result of a blow to and upward collapse of the bottom of the battery box in the event of an accident or other event), shall be covered with a rubber matting or other impact-resistant nonconductive material. The matting shall be a minimum of 1/8-inch thick and cover the entire top inside surface of the battery box. The matting shall be securely installed to maintain its position at all times.

(4) The door or cover over the compartment opening shall completely cover and, as completely as practical, seal the opening and shall be secured by an adequate and conveniently operated latch or other type fastener to prevent free leakage of the battery contents into the passenger compartment should the vehicle overturn. The door shall be hinged at the front.

The word "BATTERY" in 2-inch black letters shall be placed on the door covering the battery opening.

**44.3(4) Body sizes.**

a. School buses of 10,000 pounds GVWR or less shall be limited to the following maximum capacity ratings:

(1) Sixteen passengers when manufactured with single rear tires.

(2) Manufacturer's standard seating capacity when the chassis is manufactured with right and left side rear dual tires.

b. Bodies for conventional body-on-chassis vehicles shall be limited to wheelbase minimums and maximums shown in the table for corresponding chassis. All measurements are in inches. Measurements in the table do not apply to forward control, transit or metropolitan vehicles and vehicles rated at 10,000 pounds GVWR or less.

Seat Rows	Manufacturer's Rated Capacity	Minimum Wheelbase
5	29-30	149
6	35-36	149
7	41-42	189
8	47-48	189
9	53-54	217
10	59-60	235
11	65-66	254
12	71-72	274

**44.3(5) Bumper, rear.**

a. Rear bumper shall be of pressed steel channel at least 3/16-inch thick and 9 inches wide (high).

b. It shall be wrapped around back corners of bus. It shall extend forward at least 12 inches measured from rearmost point of body at floor line.

c. Bumper shall be attached to chassis frame rails in a manner that it may be easily removed and shall be braced to develop full strength of bumper section from rear or side impact and shall be so attached as to prevent hitching of rides.

d. Rear bumper shall extend beyond rearmost part of body surface at least one inch, measured at floor line.

EXCEPTION: Rear bumper shall be provided by the chassis manufacturer when the overall width of the body to be mounted is less than 80 inches.

e. Additions or alterations to the rear bumper, including the installation of trailer hitches are prohibited.

**44.3(6) Color (see also subrule 44.2(9)).**

a. The school bus body shall be painted a Uniform National School Bus Yellow. (See appendix “1985 Revised Edition, Standards for School Buses and Operations,” National Safety Council, 444 North Michigan Avenue, Chicago, Illinois 60611.)

b. Rear bumper, exterior lettering, numbering, body trim, lamp hoods (if any), and emergency door arrow shall be glossy black. As an alternative, the rear bumper may be covered with a black retro-reflective material as described in subrule 44.3(16), paragraph “c.”

EXCEPTION: Bus number, when placed on front or rear bumper, shall be yellow in color.

EXCEPTION: Vehicles 10,000 pounds or less, rear bumper may be chrome plated when the overall body width is less than 80 inches.

**44.3(7) Construction.**

a. Construction shall comply with all applicable federal standards as of date of manufacture.

b. Construction shall be of prime commercial quality steel or other material with strength at least equivalent to all steel as certified by bus body manufacturer. All construction materials shall be fire resistant.

c. Construction shall provide a reasonably dustproof and watertight unit. The body manufacturer shall be responsible for repairing dust and water leaks for a period of not less than 12 months from the date of delivery or acceptance by the local school district.

d. Floor shall be of prime commercial quality steel of at least 14-gauge or other material at least equal in strength to 14-gauge steel.

EXCEPTION: Vehicles 10,000 pounds GVWR or less shall be constructed of prime commercial quality steel or other material with strength at least equivalent to all-steel and certified by bus body manufacturer.

(1) The floor structure shall be insulated with plywood of at least 5 plies and 5/8-inch thick and shall be equal to or exceed properties of exterior softwood plywood C-D Grade as specified in standard issued by U.S. Department of Commerce.

EXCEPTION: On vehicles 10,000 pounds GVWR or less, 1/2-inch minimum plywood flooring equal to or exceeding the construction requirements above shall be installed by the body manufacturer.

(2) Floor shall be level from front to back and from side to side except in wheelhousing, toeboard, and driver's seat platform areas.

*e.* All openings between chassis and passenger-carrying compartment made due to alterations by body manufacturer must be sealed. See subrule 44.2(25).

*f.* As evidence that the requirements of paragraphs "a" through "e" above have been met, the school bus body manufacturer shall submit a letter of certification annually to the bureau of school administration and accreditation, Iowa department of education, prior to sale of their product in Iowa.

**44.3(8) Defrosters.**

*a.* The defrosting system shall conform to Society of Automotive Engineering Standards J-381 and 382. Auxiliary fans are not considered a defrosting or defogging system.

*b.* The defroster system shall include one right and one left defroster motor each having separate blowers and capable of producing an air flow of 150 cubic feet per minute. The defroster system shall be capable of keeping the windshield, window to the left of the driver, and glass in the entrance door clear of fog, frost, ice, and snow. This would also include any glassed area through which the driver must look to see exterior rearview mirrors.

*c.* Both the right and left defroster blowers shall secure air directly from the right and left heater core(s).

EXCEPTION: On vehicles 10,000 pounds GVWR or less, a combination heater/defroster of manufacturer's standard shall be supplied by the chassis manufacturer.

*d.* Each defroster unit shall be driver controlled and regulated, operating independently through its own duct system.

*e.* In addition, two adjustable 6-inch all-metal or polycarbonate resin defroster fans shall be installed. The fans shall have a minimum of four blades and be equipped with adequate guards. Each unit shall be independently adjustable and operated by the driver. These fans shall be on a separate circuit with a switch for each fan and be capable of 2-speed operation.

EXCEPTION: On vehicles 10,000 pounds GVWR or less, one 4-inch fan meeting the above requirements is required. The fan shall not obstruct the forward view of the driver nor be located in a position where passengers will strike the fan when entering the bus.

**44.3(9) Doors and exits.**

*a.* Service door.

(1) The service door shall be heavy-duty power or manually operated under control of the driver and designed to afford easy release and prevent accidental opening. When hand lever is used, no parts shall come together to shear or crush fingers. A power-operated door must provide for manual operation in case of power failure.

(2) The service door shall be located on the right side of the bus opposite the driver and within the driver's direct view.

(3) Overhead door controls are preferred. If under-step door control is used, it must be completely enclosed.

(4) Service door shall have a minimum horizontal opening of 24 inches and a minimum vertical opening of 68 inches. On vehicles of 10,000 pounds GVWR or less having a door opening design other than those described in subparagraph (5) below, it shall have a minimum opening of 1,200 square inches.

(5) Service door shall be of split, sedan, or jackknife type. (Split door includes any sectioned door which divides and opens inward or outward.) If one section of the split door opens inward and the other opens outward, the front section shall open outward.

(6) Lower as well as upper panels shall be of approved safety glass (see also subparagraph (10) below and subrule 44.3(46)). The bottom of lower glass panel shall not be more than 35 inches from ground when the bus is unloaded. The top of the upper glass panel shall not be more than six inches from the top of the door. On vehicles of 10,000 pounds GVWR or less, the upper window panel(s) shall be of safety glass with at least 350 square inches.

(7) The vertical closing edges on split or folding entrance doors shall be equipped with flexible material to protect children's fingers.

(8) A header pad shall be installed directly above the service door entrance on the inside. The pad shall be at least three inches wide and one inch thick and extend horizontally the full width of the door opening.

(9) There shall be no door to the left of the driver. (This shall not be interpreted to conflict with the emergency door if it is located on the left side of the bus.) Vehicles 10,000 pounds GVWR or less may be equipped with chassis manufacturer's standard door.

(10) The upper window panels of the service door shall be of insulated double glass. This standard applies to all vehicles equipped with a service door as described in subparagraph 44.3(9) "a"(5).

(11) Door hinges (piano-type acceptable) shall be securely bolted to the body. Metal screws are not acceptable.

b. Emergency door.

(1) Emergency door shall comply with all applicable federal requirements as of date of manufacture.

(2) There shall be a head bumper pad installed over each emergency exit opening on the inside of the bus body. This pad shall be at least three inches wide and one inch thick and shall extend the full width of the opening.

(3) The words "EMERGENCY DOOR" or "EMERGENCY EXIT" in lettering at least two inches high shall be located at the top of or directly above the emergency exit on both the inside and outside surfaces of the bus. Pressure sensitive markings or vinyl material are acceptable for this lettering. Lettering placed on emergency door glass is not acceptable. Where it is evident that this lettering may interfere with the words "SCHOOL BUS" on the exterior of the vehicle, the department of education may approve an alternate location for this lettering.

(4) Door latch shall be equipped with an interior handle that extends approximately to center of the emergency door. It shall lift up to release.

(5) Operating instructions describing the motions necessary to unlatch and open the emergency exit, in letters at least 3/8-inch high, of a color that contrasts with its background, shall be located within six inches of the release mechanism on the inside surface of the bus.

(6) Vandal lock system may be installed as per subrule 44.3(43).

(7) There shall be no steps or ramps leading to the emergency door.

(8) Emergency door shall be designed to be opened from the inside and outside of the bus and shall be equipped with a fastening device which may be quickly released but is designed to offer protection against accidental release. Control from the driver's seat shall not be permitted. Provision for opening from outside shall consist of a nondetachable device designed to prevent hitching but to permit opening when necessary.

(9) Emergency door shall be equipped with a slide bar, cam-operated latch. The slide bar shall have a minimum stroke of one inch. The emergency door latch shall be equipped with a suitable electric plunger switch connected with a buzzer located in the driver's compartment. The switch shall be enclosed in a metal case, and wires leading from the switch shall be concealed in the bus body. The switch shall be installed so the plunger contacts the farthest edge of the slide bar so any movement of the slide bar will immediately close the circuit on the switch and activate the buzzer.

(10) Emergency door shall be equipped with a heavy-duty metal doorstop and hold bracket or two heavy-duty straps to prevent the door from striking the bus body or lamps when it is open.

(11) Rear emergency door design:

When the emergency door is located in the rear center of the school bus, it shall be of one-piece construction, hinged on the right and open outward.

Upper portion of the emergency door shall be equipped with approved safety glazing, exposed area of which shall be not less than 400 square inches.

Lower portion of the door shall be equipped with approved safety glazing, exposed area of which shall not be less than 350 square inches.

The body opening for the emergency door shall have a minimum horizontal opening of 24 inches and a minimum vertical opening of 48 inches measured from the floor level.

EXCEPTION: On vehicles 10,000 pounds GVWR or less, rear emergency door may be of manufacturer's standard one- or two-piece design. A minimum horizontal door opening of 24 inches and a minimum vertical opening of 48 inches measured from the floor shall be provided.

(12) Left side emergency door (vehicles 48 capacity and greater).

The left side emergency door, if installed, must meet the requirements set forth in FMVSS 217, S5.4.2.1.(b), regardless of its use with any other combination of emergency exits.

It shall be hinged on the forward or front side and shall open outward.

Upper portion of the emergency door shall be equipped with approved safety glass.

Lower portion shall be of metal at least the same gauge as the body metal adjacent to the door. It shall have a minimum horizontal opening of 24 inches and a minimum vertical opening of 48 inches measured from the floor level.

In addition to this door, there shall be a rear emergency window meeting requirements set forth in FMVSS 217. See paragraph 44.3(9) "c."

c. Emergency window.

(1) Emergency window shall comply with all applicable federal requirements as of the date of manufacture.

(2) Emergency window shall be designed as an emergency exit and shall be no smaller than 16 inches in height and 54 inches in width on buses 80 inches or more in width; it shall be no smaller than 16 inches in height and 48 inches in width on buses less than 80 inches in width. The window shall be hinged from the top and devised and operated to ensure against accidental closing in an emergency. The window shall be released by operation of not more than two mechanisms which do not have to be operated simultaneously.

(3) Paneling is required to cover the space between the top of the rear divan seat and the inside surface of emergency window at the rear.

(4) Words "EMERGENCY EXIT" in letters at least two inches high shall be placed at the top of or directly above the emergency exit on both the inside and outside surfaces of the bus. (Pressure sensitive markings of vinyl material are acceptable for this lettering.)

(5) Emergency window shall be designed to be opened from inside and outside of the bus and shall be equipped with a fastening device which may be quickly released but is designed to offer protection against accidental release. Control from the driver's seat shall not be permitted. A provision for opening from the outside shall consist of a nondetachable device designed to prevent hitching but to permit opening when necessary.

(6) Emergency window in rear shall be equipped with a latch (or latches) on the inside and be connected with an electrical buzzer that will actuate when the latch is being released.

(7) Emergency window vandal lock is permissible when installed in accordance with the requirements stated in subrule 44.3(43).

d. Rooftop emergency exit/ventilator system. See subrule 44.3(44).

**44.3(10) Emergency equipment.**

a. All emergency equipment including first-aid kit, fire extinguisher, triangular warning devices, and fuses shall be located within the driver's compartment.

b. Whenever the emergency equipment is mounted within an enclosed compartment, the compartment shall be plainly labeled to indicate the location of equipment.

c. The bus shall be equipped with three triangular warning devices conforming to federal requirements as of date of manufacture. The devices must be stored in a container mounted in an accessible location in the driver's compartment.

d. The bus shall be equipped with three 30-minute stand-up fusees, stored in a canister with a lid and placed in the driver's compartment.

e. All emergency equipment shall be securely mounted so that in the event the bus is overturned, this equipment is held in place.

**44.3(11) Fire extinguisher.**

a. The driver's compartment of the bus shall be equipped with at least one pressurized dry-chemical fire extinguisher complete with hose, of at least five-pound capacity, in full view and readily accessible to the driver. The extinguisher shall be mounted in an extinguisher manufacturer's heavy-duty automotive bracket to prevent accidental release in the case of an accident or in the event the bus overturns. The fire extinguisher shall be accessible to the driver and mounted so it can be easily removed from the bus if necessary. See subrule 44.3(36).

b. The fire extinguisher shall have a minimum rating of 2A-10BC and shall be equipped with a calibrated or marked gauge to indicate the amount of pressure in the extinguisher. Plastic discharge heads and related parts are not acceptable; however, a flexible hose of rubber or similar material shall be securely attached to the discharge head of the extinguisher to aid in accurately directing the dry chemical to the point of the fire. This requirement shall apply to all new and replacement fire extinguishers.

c. Each extinguisher shall meet the applicable standards prescribed by Underwriters Laboratories or Factory Mutual Laboratories and shall bear a permanently affixed nameplate of the testing laboratory. Any testing laboratory must be one that is recognized by the Iowa state fire marshal.

d. All fire extinguishers, including their inspection and maintenance, shall be in accordance with the National Fire Protection Association, Pamphlet No. 10, Portable Fire Extinguishers 1981.

An inspection shall be performed daily to ensure that the extinguisher is available, has not been tampered with or damaged, and is fully charged.

Extinguishers shall be subjected to maintenance every six years including the thorough examination of mechanical parts, the extinguishing agent and the expelling means.

Every extinguisher canister shall undergo hydrostatic testing every 12 years to determine its suitability for continued use.

e. Record keeping. Each extinguisher shall have a tag or label securely attached that indicates the month and year the maintenance and hydrostatic testing were performed and shall identify the person performing the service.

**44.3(12) First-aid kit.**

a. The bus shall carry a Grade "A" metal first-aid kit which is moisture and dust proof and shall either be mounted in full view or the location of the kit labeled so any driver will know where to find it. The kit shall be accessible to the driver and mounted so it can be removed from the bus if necessary.

b. First-aid kits must be approved by the Iowa department of education.

c. Mounting of the first-aid kit shall comply with one of the following:

(1) Located in an enclosed compartment with access door and easily accessible to the driver. The access door shall have a retaining device which will prevent accidental release in the event of an accident or rollover. See subrule 44.3(36).

(2) If not in an enclosed compartment, the first-aid kit shall be securely fastened into place with a retaining device which will prevent accidental release in the event of an accident or rollover.

d. Sizes required for buses:

(1) Ten-unit kit required in all vehicles carrying 17 passengers or less.

(2) Sixteen-unit kit required in all buses carrying 18 to 30 passengers.

(3) Twenty-four-unit kit required in all buses carrying 31 to 48 passengers.

(4) Thirty-six-unit kit required in all buses carrying 49 or more passengers.

<u>Item</u>	<u>10</u> <u>Unit</u>	<u>16</u> <u>Unit</u>	<u>24</u> <u>Unit</u>	<u>36</u> <u>Unit</u>
1" Adhesive compress	1	2	2	3
2" Bandage compress	1	1	2	2
3" Bandage compress	-	1	2	2
4" Bandage compress	1	1	2	2
3" x 3" Plain gauze pads (dressings)	1	1	1	4
Gauze roller bandage (4" x 5 yd.)	1	1	2	4
Plain absorbent gauze Compress (2 pc. 18" x 36")	1	2	4	6
Plain absorbent gauze Compress (24" x 72")	1	2	3	5
Triangular bandages	2	4	5	7
Wire splint	1	1	1	1
Instant splints may be substituted.				

**44.3(13) Floor covering.**

a. Floor in underseat area, including tops of wheel housings, driver's compartment, and toeboard, shall be covered with fire-resistant rubber floor covering or equivalent having a minimum overall thickness of 0.125 inch. There shall not be a seam in the floor covering between the front of the driver's seat and the base of the slope of the toeboard.

b. The floor covering in the aisle shall be of aisle-type, fire-resistant rubber or equivalent, non-skid, wear-resistant, and ribbed. Minimum overall thickness shall be 0.1875 inch measured from the tops of ribs.

c. The floor covering must be permanently bonded to the floor and must not crack when subjected to sudden changes in temperature. Bonding or adhesive material shall be waterproof and shall be of type recommended by the manufacturer of floor covering material. All seams must be sealed with waterproof sealer.

d. Cove molding shall be used along the side walls and rear corners. All floor covering seam separations shall be covered with durable metal stripping.

**44.3(14) Fuel fill opening and cover.** Where an opening in the school bus body skirt is needed for access to the fuel fill cap, the opening shall be large enough to permit filling the fuel tank without the need for special fuel nozzle adapters, a funnel, or other devices. The opening shall be equipped with a forward hinged cover held closed by a spring or other conveniently operated device.

EXCEPTION: Vehicles 10,000 pounds GVWR or less may be of manufacturer's standard.

**44.3(15) Heaters.**

a. Heaters are required and they shall be of hot water type.

b. There shall be at least one left front heater of fresh air or combination fresh air and recirculating type, and one right front heater of recirculating type provided.

c. At least one additional heater shall be of recirculating air type and located rear of wheel well. This heater shall be rated at not less than 80,000 Btu.

d. On vehicles 10,000 pounds GVWR or less, the front heater/defroster shall be of manufacturer's standard, plus one additional rear heater with a minimum rating of 20,000 Btu's shall be provided.

e. Portable heaters may not be used.

f. Heaters shall be capable of maintaining inside temperature of 50 degrees Fahrenheit at average minimum January temperatures as established by U.S. Department of Commerce Weather Bureau for the area in which heater is required.

g. Heaters shall bear nameplate rating in accordance with standard code for testing and rating automotive bus hot water heating and ventilating equipment, plate to be affixed by heater manufacturer.

h. At least one heavy-duty cut-off valve shall be installed and accessible from the driver's seat. EXCEPTION: On vehicles 10,000 pounds GVWR or less, cut-off shall be of manufacturer's standard.

i. Two heavy-duty, cut-off valves shall be installed, one each in the inlet and outlet heater lines in the engine compartment.

j. Heater hose shall conform to SAE Standard J20E. Heater lines on the interior of bus shall be shielded to prevent scalding of the driver or passengers.

k. Interior heater fans including fan blades and motor housing or other heater components shall be enclosed within a compartment or case.

**44.3(16) Identification.**

a. The body shall bear the words "SCHOOL BUS" in black letters at least eight inches high on both front and rear of the body or on attached signs. The lettering shall be placed as high as possible without impairment of its visibility. The lettering shall conform to "Series B" of Standard Alphabets of Highway Signs.

b. The bus, whether school owned or privately owned, shall bear the official name of the school on each side in black standard unshaded letters at least five inches, but not more than seven inches high.

Examples:

- (1) Blank community school district.
- (2) Blank independent school district.
- (3) Blank consolidated school district.

If there is insufficient space due to the length of the name of the school district, the words community, independent, consolidated, and district may be abbreviated. If after the abbreviations there is still insufficient space available, abbreviation of the school district name is permissible upon prior approval by the bureau of school administration and accreditation, Iowa department of education.

c. The words "SCHOOL BUS" (paragraph "a" above) on the front and rear of the vehicle and the name of the school district (paragraph "b" above) on each side of the vehicle may consist of letters made of retroflective material. Retroflective material must appear to be of normal black color during daylight hours, however, will be seen as a reflective material whenever a direct light source strikes the lettering material in the dark.

d. The rated pupil seating capacity of the bus shall be printed to the left of the entrance door, at least six inches below the name of the school district in 2-inch characters. (The word "CAPACITY" may be abbreviated; for example, rated cap. 48.)

e. The number of the bus shall be printed in not less than 5-inch or more than 8-inch characters. See subrule 44.3(6) for letter color. The location of the number is at the discretion of the local district except that the number:

(1) Shall be located in an area not more than 24 inches to the rear of the service door nor more than 36 inches from the ground.

(2) If located on either the front or rear bumper shall be yellow in color.

(3) Shall not be located on the same line as the name of the school district, on the emergency door, or in a location that will interfere with the words "SCHOOL BUS."

f. Privately owned buses shall also bear the name of the owner, followed by the word "OWNER" in 1½-inch characters printed approximately six inches below the bus capacity on the right side of the bus.

g. Each school bus emergency exit shall have the designation "EMERGENCY DOOR" or "EMERGENCY EXIT" as appropriate in letters at least two inches high, of a color that contrasts with its background, located at the top or directly above the emergency exit on both the inside and outside surfaces of the bus. Lettering affixed to the emergency door glass is not acceptable. Where it is evident that this lettering may interfere with the words "SCHOOL BUS" on the exterior of the vehicle, the department of education may approve an alternate location for this lettering.

*h.* The word "BATTERY" in 2-inch black letters shall be placed on the door covering the battery opening.

*i.* Pressure sensitive markings of vinyl material may be used for the above lettering in lieu of painting.

*j.* Any lettering, including the name of the school's athletic team(s), numbers, drawings, or characters other than manufacturer's trademarks or those specifically mentioned in paragraphs "a" to "h" above are prohibited.

**44.3(17) Inside height.** Inside body height shall be a minimum of 72 inches, measured metal to metal, at any point on longitudinal center line from front vertical bow to rear vertical bow.

EXCEPTION: Vehicles 10,000 pounds GVWR or less, the inside height shall be a minimum of 62 inches measured as stated above.

**44.3(18) Insulation.**

*a.* The ceiling and walls shall be insulated with at least 1½-inch fiberglass batting or equal to deaden sounds and to reduce vibrations to a minimum. All insulation shall be firmly installed and retain its original position.

*b.* The insulation shall be of burn-resistant material meeting federal requirements at date of manufacture.

*c.* Plywood shall be used for floor insulation. See subrule 44.3(8).

**44.3(19) Interior.**

*a.* Interior of bus shall be free of all unnecessary projections likely to cause injury. This includes book racks, radio speakers, coat hooks, and coat railings. Radio speakers are permissible in the passenger area only if they have been flush mounted.

*b.* This standard requires inner lining on ceilings and walls. If ceiling is constructed to contain lap joints, forward panel shall be lapped by rear panel and exposed edges shall be beaded, hemmed, flanged, or otherwise treated to minimize sharp edges.

*c.* An access panel must be provided, front and rear, so lights and wiring for the 8-light warning system may be repaired or serviced without removing ceiling panels.

*d.* Cowl area shall not be modified by the body manufacturer to interfere with driver's visibility of gauges or instrument panel.

*e.* The driver's area forward of the foremost padded barriers will permit the mounting of required safety equipment and vehicle-operating equipment.

*f.* Every school bus shall be constructed so the noise level taken at the ear of the occupant nearest to the primary vehicle noise source shall not exceed 90 DBA when tested according to the "noise test procedure" outlined in the 1985 Revised Edition of Standards for School Buses and Operations.

**44.3(20) Lamps and signals.**

*a.* All lamps and lamp components shall meet or exceed applicable standards established by the Society of Automotive Engineers (SAE) and the American Association of Motor Vehicle Administrators (AAMVA).

*b.* Clearance lamps. The body shall be equipped with two amber lamps at the front and two red clearance lamps at the rear mounted at the highest and widest portion of the body.

*c.* Identification lamps. The bus shall be equipped with three amber identification lamps on the front and three red identification lamps on the rear. Each group shall be evenly spaced not less than 6 or more than 12 inches apart along a horizontal line near the top of the vehicle.

*d.* Intermediate side marker lamps. On all buses over 30 feet long, one amber side lamp is required on each side, located midway between the front and rear clearance lamps.

*e.* Reflectors:

(1) Bus shall be equipped with two amber reflectors, one on each side at the lower front and corner of the body approximately at floor level and back of the door on the right side, and at a similar location on the left side. On all buses over 30 feet long, an additional amber reflector is required on each side at or near the midpoint between the front and rear side reflectors.

(2) Bus shall be equipped with four red reflectors; one at each side at or near the rear; and two on the rear, one at each side.

(3) Reflectors are to be mounted at a height not to exceed 42 inches nor less than 30 inches above the ground on which the vehicle stands.

(4) Reflectors shall be securely attached to the bus body with sheet metal screws or equivalent. Adhesive or stick-on reflectors are not acceptable.

*f.* Back-up lamps. The school bus body manufacturer shall provide two back-up lamps each of which shall be a minimum of seven inches in diameter and covered by a white or clear lens.

EXCEPTION: Vehicles of 10,000 pounds GVWR or less, back-up lamp system may be of manufacturer's standard.

*g.* Interior lamps. Interior lamps shall be provided which adequately illuminate the interior aisle and the stepwell. In addition, the following interior lamps shall be provided:

(1) Supervisor's light. The rearmost ceiling light or a separate light may be used as a supervisor's light. This light shall have a separate switch controlled by the driver so this light may be used when traveling after sunset.

(2) Driver's area dome light. This light shall have a separate switch controlled by the driver and shall illuminate the driver's compartment area.

*h.* License plate lamp. Bus shall be equipped with a rear license plate illuminator. This lamp may be combined with one of the tail lamps.

*i.* Stop/tail (brake) lamps. The bus shall be equipped with four combination, red, stop/tail lamps having double filament lamp bulbs and connected to the headlamp and brake-operated stop lamp circuits and positioned as follows:

(1) The combination lamps with a minimum diameter of seven inches, or if a shape other than round, minimum of 38 square inches of illuminated area, shall be mounted on the rear of the bus just inboard of the turn signals.

(2) Two combination lamps mounted not less than 40 inches from the surface on which the vehicle stands and as directly as possible beneath the two 7-inch stop/tail lamps mentioned above.

*j.* Items described in paragraphs "*b*," "*c*," "*d*," and "*i*" shall be connected to the headlamp switch.

*k.* Warning signal lamps. School bus warning signal lamps are alternately flashing lamps at the same horizontal level intended to identify the vehicle as a school bus and to inform other users of the highway that the vehicle is about to stop or is stopped to take on or discharge school children. Requirements for lights used on school buses shall be as follows:

(1) All school buses shall be equipped with four alternately flashing warning lamps at the front and four alternately flashing warning lamps at the rear of the bus. Two of each of these sets of four lamps shall be amber in color and two shall be red in color. Lamps shall conform to the Society of Automotive Engineers' Standard "J887, July, 1964" except that the candlepower requirement for the amber lamps shall be 2½ times that specified for the red signal lamps. Strobe lights are permissible.

(2) Installation of these lamps shall conform to the standard except that an amber signal lamp shall be located adjacent to each red signal lamp at the same level and at the side of the red signal lamp nearer the vertical center line of the bus. As a further exception to the standard, the system of red and amber signal lamps shall be wired so the amber signal lamps are energized manually, the red signal lamps are energized automatically, and the amber signal lamps are de-energized automatically when the bus entrance door is opened.

(3) Area around lens of each alternately flashing signal lamp and extending outward approximately 3 inches shall be painted black. In installations where there is no flat vertical portion of body immediately surrounding entire lens of lamp, a circular or square band of black approximately 3 inches wide, immediately below and to both sides of lens, shall be painted on body or roof area against which signal lamp is seen (from distance of 500 feet along axis of vehicle). Visors or hoods with an appropriate black background to fit the shape of hoods/visors and roof cap may also be used.

(4) The switch to activate the amber flashing warning lamps shall be hand operated and located to the left and forward or forward of the driver near the front of the control panel and in a position to enable the driver to operate it while looking straight ahead. There shall be two pilot lights, one of which shall display an amber light when the amber warning lamps are flashing and the other which shall display a red light when the red warning lamps are flashing. The lens for the pilot lights shall be approximately one-half inch in diameter. These pilot lights shall be located in a position where they can be readily observed by the driver while looking straight ahead. The switch and pilot lights are to be properly labeled. Light monitor systems are not acceptable as substitutes for required pilot lights.

(5) Operation of warning light system.

With entrance door closed, activate manual switch. Amber pilot light and amber warning lights flash.

Open entrance door. Amber pilot and amber warning lights go off and red pilot and red warning lights flash. Stop arm is automatically extended.

Close entrance door. All lights go out and stop arm retracts automatically.

Open entrance door without depressing manual push button. No lights flash nor does stop arm extend.

With entrance door open, depress manual push button. Red pilot and red warning lights flash. Stop arm is automatically extended.

(6) There shall be a canceling switch easily accessible to the driver which will deactivate the amber lamps if they are accidentally activated or if the driver discovers there is no need to make a stop.

l. Turn signal lamps.

(1) Bus shall be equipped with four Class A amber flashing turn signal lamps at least 7 inches in diameter or 36 square inches of surface area that meet the specifications of the Society of Automotive Engineers. These signals must be independent units and must be equipped with a four-way hazard warning switch to cause simultaneous flashing of the turn signal lamps when needed as a vehicular traffic hazard warning. Telltale or indicator lights plainly visible to operator shall be provided to indicate that each signal is functioning properly.

EXCEPTION: Vehicles 10,000 pounds GVWR or less, the front turn signal lamps shall be of manufacturer's standard. Rear turn signal lamps on vehicles 80 inches or less in overall body width shall be of manufacturer's standard.

(2) Illuminated signal area of the lamps shall be in the form of an arrow with head and shaft or arrowhead only. The luminous area shall not be less than 12 square inches. The area of the lamp face surrounding the luminous area shall be black. This may be a metal shield painted dull black or a vitreous black enamel applied to the lens itself.

(3) Lens coloring and wiring must conform to SAE specifications.

(4) Flashing rate for turn signal lamps shall be no slower than 60 and no faster than 120 times per minute under normal operating conditions. The "on" period of flasher shall be long enough to permit bulb filament to come to full brightness.

(5) Entire lamp assembly must meet SAE specifications and successfully pass vibration and shock, moisture, dust, corrosion, and photometric tests.

(6) Each turn signal lamp shall be mounted with its axis substantially parallel to longitudinal axis of vehicle.

Rear lamps shall be mounted as near to the right and left side of the bus as possible, but in no case shall outer edge of lamps be more than 10 inches from outer body width line. They shall be mounted below the rear window line, but in no case shall distance from top edge of lamp to lower edge of window line exceed five inches.

Front lamps shall be mounted on the front corners of the body. The distance from the top edge of lamp to the lower windshield line shall not exceed five inches.

NOTE: An additional turn signal mounted on the top of each fender by the chassis manufacturer is permissible.

EXCEPTION: Front lamps on pusher, cab over, or forward control bodies must be mounted on the front face of bus and at least 12 inches above the bumper.

EXCEPTION: Vehicles 10,000 pounds GVWR or less, mounting and location of lamps shall be of manufacturer's standard.

(7) All vehicles over 10,000 pounds GVWR shall have an amber clearance lamp with a minimum of four candlepower mounted on the right side of the body at approximately seat level rub rail height just to the rear of the service door and another one at approximately opposite the driver's seat on the left side. These lamps are to be connected to operate only with the regular turn signal lamps.

*m.* White flashing strobe light rated for outdoor use and weather sealed shall be installed on the roof of the bus at a point one to ten feet from the rear center of the bus. The lighting system must be controlled by a separate switch with indicator light which when lit will indicate that the strobe light is turned on. The light shall be used in fog, rain, snow, or at times when visibility is restricted. Each model strobe must be periodically approved by the motor vehicle division, Iowa department of transportation.

**44.3(21) Metal treatment.**

*a.* All metal used in construction of bus body shall be zinc or aluminum coated or treated by equivalent process before bus is constructed. (Included are items such as structural members, inside and outside panels, floor panels, and floor sills; excluded are door handles, grab handles, stanchions, interior decorative parts, and other interior plated parts.)

*b.* All metal parts that will be painted shall be (in addition to above requirements) chemically cleaned, etched, zinc-phosphate coated, and zinc-chromate or epoxy-primed or conditioned by equivalent process. In providing for these requirements, particular attention shall be given to lapped surfaces, welded connections of structural members, cut edges, punched or drilled hole areas in sheet metal, closed or box sections, unvented or undrained areas, and surfaces subjected to abrasion during vehicle operation.

*c.* As evidence that above requirements have been met, samples of materials and sections used in construction of bus body, when subjected to 1,000-hour salt spray test as provided for in latest revision of ASTM designation: B 117, "standard method of salt spray (fog) testing," shall not lose more than 10 percent of material by weight.

**44.3(22) Mirrors.**

*a.* All mirrors and mountings shall meet federal requirements as of date of manufacture.

*b.* Interior mirrors: Interior mirror shall be either clear view laminated glass or clear view glass bonded to a backing which retains the glass in the event of breakage. Mirror shall have rounded corners and protected edges and shall have a minimum of a 6-inch x 30-inch mirror. Mirror shall be positioned to afford good rearward view of pupils and roadway to the rear.

EXCEPTION: Vehicles less than 10,000 pounds GVWR shall have a minimum of a 6-inch x 16-inch mirror overall meeting the above specifications.

*c.* Exterior mirrors: Each bus shall have a minimum of one exterior left side and one exterior right side rearview mirror with a minimum of 60 square inches each of flat mirror glass. Each mirror shall be firmly supported and adjustable to allow any driver to have visibility aft of the rear wheels at ground level. Electrically heated exterior rearview mirrors are recommended.

*d.* Exterior indirect mirror systems.

(1) Crossview mirror system: Each bus shall have a mirror system which will provide a clear, unobstructed view of the area in front of the bus when tested to the following:

When a rod 30 inches long is placed upright on the ground at any point along a traverse line one foot forward of the forward-most point of a school bus and extending the width of the bus, at least 7½ inches of the length of the rod shall be visible to the driver either by direct view or by means of an indirect visibility system.

The crossview system shall include a minimum of one left-hand and one right-hand, 7½-inch diameter, convex crossview mirrors.

(2) Rearview mirror system: Each bus shall have a mirror system which will provide a clear, unobstructed view of the area immediately adjacent to the front wheels and at the entrance door. This mirror system shall include one right-hand and one left-hand, 7½-inch diameter, convex rearview mirror.

NOTE: In (1) and (2) above, elliptical or hemispherical mirrors may be substituted on a two-for-one basis if indirect visibility requirements are met.

**44.3(23) Mounting.**

EXCEPTION: Mounting standard does not apply to integral units less than 10,000 pounds GVWR or less than 80 inches in overall body width.

a. Chassis frame shall extend to rear edge of rear body cross member. Bus body shall be attached to chassis frame at each main floor sill, except where chassis components interfere with shifting or separation of body from chassis under severe operating conditions.

b. Body front shall be attached and sealed to chassis cowl to prevent entry of water, dust, and fumes through joint between chassis cowl and body.

c. Insulating material shall be placed at all contact points between body and chassis frame and shall be attached to chassis frame or body member so it will not move under any normal operating conditions.

d. All new body-on-chassis school bus bodies shall be mounted and certified by the body or final stage manufacturer. The mounting of the body to the chassis shall be in accordance with the design objectives of the School Bus Manufacturer's Institute.

e. The refurbishing or reconditioning of a body-on-chassis school bus is restricted to the repair and replacement of school bus body or chassis components. The original body and chassis, as certified by the original equipment manufacturers, shall be retained as a unit upon completion of repairs. It is not permissible to exchange or interchange school bus bodies and chassis. The refurbisher or reconditioner shall certify that the vehicle meets all state and federal construction standards in effect as of the date of chassis manufacture and shall provide suitable warranty on all work performed.

**44.3(24) Mud flaps.**

a. Mud flaps or guards are required and shall be provided and installed by the body manufacturer or manufacturer's representative for both front and rear wheels.

b. Front mud flaps or guards shall be of adequate size to protect body areas vulnerable to road debris from wheels and mounted to be free of wheel movement at all times.

c. Rear mud flaps or guards shall be comparable in size to width of rear wheelhousing, and shall reach within approximately nine inches of the ground when bus is empty. They shall be mounted at a distance from the wheels that will permit free access to spring hangers for lubrication and maintenance, and to prevent their being pulled off while vehicle is in reverse motion, or damaged by tire chains.

**44.3(25) Overall length.** Overall length of the bus shall not exceed 40 feet.

**44.3(26) Overall width.** Overall width of the bus shall not exceed 96 inches, excluding accessories.

**44.3(27) Radio system.**

a. In the interest of safety for the children transported and economy of operation, a two-way radio communication system is highly recommended.

b. Each mobile unit installed on a school bus should meet the following recommendations:

(1) FM high band, 150-170 MHZ or UHF, 450-470 MHZ with capability of transmitting and receiving on at least three channels.

(2) Units should be equipped with tone-coded squelch (CTCSS).

(3) Transmit power should be no less than 15 watts, and transmitter should meet EIA RS-152B standards.

(4) Receiver sensitivity should be no less than .25 uV (12dBSINAD) and receiver should meet EIA RS-204C standards. The receiver should include channel scan.

(5) Installation should include antenna, cabling, and at least one-year warranty. FCC license is required.

c. Base/control station configuration. Should be compatible with recommended mobile unit and designed as required to cover specified service area. Installation should include antenna, cabling, and at least a one-year warrant period. FCC license is required.

**44.3(28) Rub rails.**

a. There shall be one rub rail located on each side of bus approximately at seat level which shall extend from rear side of entrance door completely around bus body (except for emergency door) to point of curvature near outside cowl on left side.

EXCEPTION: On vehicles 10,000 pounds GVWR or less, one rub rail on each side of bus approximately at seat level shall extend only to radii of right and left rear corners.

b. There shall be one rub rail, the center of which shall be located not more than six inches above the floor line and which shall cover same longitudinal area as upper rub rail, except at wheelhousings, and shall extend only to radii of right and left rear corners.

c. Both rub rails shall be attached at each body post and all other upright structural members.

d. Both rub rails shall be four inches or more in width in their finished form, shall be of 16-gauge steel or suitable material of equivalent strength, and shall be constructed in corrugated or ribbed fashion.

e. Both rub rails shall be applied outside body or outside body posts. Pressed-in or snap-on rub rails do not satisfy this requirement.

f. Bus bodies equipped with rear engine compartment—rub rails need not extend around rear corners.

**44.3(29) Seat, driver.**

a. A driver's seat shall be provided which conforms to federal standards at date of manufacture and, in addition, complies with the following requirements:

(1) Driver's seat shall have a minimum distance between steering wheel and seat back of not less than 11 inches when the seat is in the forward-most position.

(2) Seat shall be contoured with adequate padding support on sides designed to provide for driver support and comfort and positioned on the center line of steering wheel.

(3) Arm rests are permissible; however, the right arm rest shall be hinged and capable of being moved to allow ease of entrance and exit from the seat by the driver.

(4) The seat shall have vertical and fore-and-aft adjustment of not less than four inches.

(5) Driver's seat shall be securely mounted to the floor of the bus with Grade "5" or better bolts and secured with locking nuts or lock washers and nuts. Lag screws are not acceptable.

b. Driver restraint system.

(1) A restraint system for the driver shall be provided which conforms to federal standards at date of manufacture.

(2) A locking retractor seat belt shall be provided.

(3) A retractor system and "protective boots" shall be installed for keeping belts clean and off the floor when not in use. Belts shall be of sufficient length to secure the driver when the seat is in any position.

(4) Restraint system shall be anchored or guided at the seat frame to prevent the driver from sliding sideways from under the belt.

c. On vehicles 10,000 pounds GVWR or less, the driver's seat and restraint system comply with applicable motor vehicle safety standards.

**44.3(30) Seat belt for passengers.** Vehicles 10,000 pounds GVWR or less shall conform to federal standards at date of manufacture.

**44.3(31) Seats and crash barriers.**

a. All seats, component parts, and seat anchorages shall comply with applicable federal requirements as of date of manufacture.

b. All seats shall have a minimum depth of 15 inches.

c. In determining the rated seating capacity of the bus, allowable average rump width shall be:

(1) Thirteen inches where three:three seating plan is used.

(2) Fifteen inches where three:two or two:two seating plan is used.

(3) Thirteen inches where three:two seating plan is used on vehicles 79 inches to 90 inches inside.

d. All seats shall be forward facing and shall be securely fastened with Grade "5" or better bolts and locking nuts or nuts with lock washers on that part or parts of the bus which support them.

- e. Jump seats or portable seats are prohibited.
  - f. Seat, seat back cushion and crash barrier shall be covered with a material having 42-ounce finished weight, 54-inch width, and finished vinyl coating of 1.06 broken twill or other material with equal tensile strength, tear strength, seam strength, adhesion strength, and resistance to abrasion, cold and flex separation.
  - g. All fabric seams shall be chain or lock-stitch sewn with two threads, each equal to or exceeding the tensile strength of "F" rated nylon thread.
  - h. The backs of all seats of similar size shall be of same width at top and of same height from the floor and shall slant at same angle with the floor. (Backs of seats shall be free of coat rails.)
  - i. Seat back height shall not exceed that allowed by federal requirements at date of manufacture.
- 44.3(32) Steps.**
- a. First step at service door shall be not less than 12 inches and not more than 16 inches from ground based on standard chassis specifications.
  - b. Service door entrance may be equipped with two-step or three-step stepwell.
  - c. Steps shall be enclosed to prevent accumulation of ice and snow.
  - d. Steps shall not protrude beyond side body line.
  - e. A "grab handle" or "grab rail" shall be provided in an unobstructed location inside the doorway, and it shall extend down into and be anchored in the stepwell so it may be reached by small children boarding the bus.

EXCEPTION: On school bus conversions constructed on a van-type compact truck or front section vehicle with a gross vehicle weight of 10,000 pounds or less, steps shall be of manufacturer's standard.

**44.3(33) Step treads.**

- a. All steps, including floorline platform area, shall be covered with 3/16-inch rubber floor covering or other materials equal in wear and abrasion resistance to top grade rubber.
- b. Metal back of tread, minimum 24-gauge cold roll steel, shall be permanently bonded to ribbed rubber. Grooved design shall be such that grooves run at 90-degree angle to long dimension of step tread.
- c. Three-sixteenth-inch ribbed step tread shall have a 1½-inch white nosing as an integral piece without any joint.
- d. Rubber portion of step treads shall have following characteristics:  
Special compounding for good abrasion resistance and high coefficient of friction.  
Flexibility so it can be bent around a ½-inch mandrel at both 130 degrees Fahrenheit and 20 degrees Fahrenheit without breaking, cracking or crazing.  
Show a durometer hardness 85 to 95.
- e. A 3-inch white rubber step edge at floor level shall be provided which is flush with floor covering.

**44.3(34) Stirrup steps.** There shall be one folding stirrup step and suitably located grab handle on each side of front of body for easy accessibility for cleaning windshield and lamps.

EXCEPTION: Transit and metropolitan vehicles, a step, in lieu of the stirrup steps, is permitted in or on the front bumper.

EXCEPTION: Vehicles 10,000 pounds GVWR or less, standard does not apply.

**44.3(35) Stop signal arm.**

- a. The stop signal arm shall be a flat 18-inch octagon exclusive of brackets for mounting. All lamps and lamp components shall meet or exceed applicable standards established by the Society of Automotive Engineers (SAE) and the American Association of Motor Vehicle Administrators (AAMVA).
- b. The arm shall be constructed of aluminum alloy with a minimum gauge of .080 and temper of 5052-H34 or equivalent.
- c. It shall have the word "STOP" printed on both sides in silver letters at least six inches high with a stroke width of approximately 7/8 inch on bright red background. The border or outer edge shall be ½-inch wide silver.

d. The color shall conform to the colors specified by the “Manual on Uniform Traffic Control Devices for Streets and Highways,” 1972 Edition.

e. The entire sign, including letters, shall be reflectorized and shall have the following minimum brightness values at .2, .5, and 1.5 divergence angle expressed as average candlepower per foot-candle per square foot of material. Wet performance measurements shall be conducted in accordance with standard rainfall test specified in Federal Specification LS 300A and the brightness of the reflective sheeting totally wet by rain shall not be less than 90 percent of the above values.

	Silver-White		
Div. Angle	.2	.5	1.5
Inc. Angle			
-4°	250.0	95.0	4.0
40°	120.0	54.0	2.0

Wet performance measurements shall be conducted in accordance with standard rainfall test specified in Federal Specification LS 300A and the brightness of the reflective sheeting totally wet by rain shall not be less than 90 percent of the above values.

f. Before mounting on the substrate, the reflective sign face shall be processed and finished with materials and shall be mechanically applied as specified by the sheeting manufacturer. All copy shall be sharply defined and clean cut.

g. Stop arm blade shall be equipped with two double-faced, alternately flashing red lights of at least 4-inch diameter which are automatically activated when the stop arm is extended. (Strobe lamps are acceptable.)

h. The sign shall be mounted outside the bus on the left side opposite the driver and immediately below the window. Rubber spacers shall be installed on either the side of the bus or the stop arm to prevent sign from making abrasive contact with side of bus.

i. A wind guard shall be installed which prevents air currents from circulating behind blade.

j. The stop arm shall be vacuum, electric or air operated, and the system must positively hold the sign in extended or retracted position to prevent whipping in the wind.

k. The school bus body manufacturer shall install a separate vacuum tank as a stop arm reservoir on all chassis equipped with vacuum-over-hydraulic brakes and vacuum operated stop arm. This tank is to be connected to the stop arm only and shall be sized to allow a minimum of three complete operations of the stop arm with the engine off.

EXCEPTION: When there are no body options requiring a vacuum reservoir, or when the vacuum source is a pump that operates only body options, the vacuum tank is not required.

l. The air for an air-operated stop arm shall come from a connection to the air line serving the regular air brake system. Body supplier shall provide the necessary check valve and pressure reduction valve to safeguard the air supply for brake application.

m. The stop arm control valve is to be activated by a switch that makes contact when the entrance door handle is moved toward the open position provided that the eight-light flashing warning light activating system has been switched on.

n. The manufacturer shall certify that all signs conform to this specification and will replace without cost to the school district all signs that fail to meet these requirements.

**44.3(36) Storage compartments.**

a. An enclosed space shall be provided in the driver’s compartment for storing manuals and bus driver records.

b. A compartment for storing the fire extinguisher, first-aid kit, and other equipment within the driver’s compartment is permissible. If, however, the compartment is to be capable of being locked, an audible warning signal shall be installed which will notify the driver of the locked compartment when the ignition is turned on. The vehicle shall not be operated with this compartment locked. The door to this compartment shall be labeled “EMERGENCY EQUIPMENT” using 2-inch black letters.

c. In addition, a metal container of adequate strength and capacity for storage of tire chains, tow chains, and tools necessary for minor emergency repairs while the bus is en route may be provided but is not required. If provided, it may be located either inside or outside the passenger compartment, but if inside it shall have a cover (seat cushion may not serve for this purpose) and be securely fastened to floor or seat frame. The container must have a latch to keep the cover securely fastened to it to prevent contents from spilling in case the bus overturns.

**44.3(37) *Sun shield.*** There shall be installed on the windshield header or 6-inch by 30-inch mirror bracket an interior sun visor which is double bracketed, adjustable, and not less than 6 inches wide and 30 inches long.

EXCEPTION: Vehicles 10,000 pounds GVWR or less, provided by chassis manufacturer.

**44.3(38) *Traction assisting devices.***

a. Where required or used, sanders shall:

- (1) Be of hopper cartridge-valve type.
- (2) Have metal hopper with all interior surfaces treated to prevent condensation of moisture.
- (3) Be of at least 100-pound (grit) capacity.
- (4) Have a cover on the filler opening of hopper which screws into place and seals the unit airtight.
- (5) Have discharge tubes extending to front of each rear wheel under fender.
- (6) Have nonclogging discharge tubes with slushproof, nonfreezing rubber nozzles.
- (7) Be operated by electric switch with telltale light mounted on instrument panel.
- (8) Be exclusively driver controlled.
- (9) Have a gauge to indicate hoppers need refilling when they are down to one-quarter full.

b. Automatic traction chains may be installed.

**44.3(39) *Tow hooks, front.*** On vehicles of 10,000 pounds GVWR or less and on body/chassis of integral design manufactured by a body manufacturer, the body manufacturer or dealer representative shall adequately secure two front tow hooks to the front end of the frame rails. Tow hooks shall not project beyond the front bumper.

**44.3(40) *Tow hooks, rear.*** Two rear tow hooks are required on all school buses, attached to the chassis frame and located under the rear bumper so the hook portion is under the body.

**44.3(41) *Undercoating.***

a. Entire underside of bus body, including floor sections, cross members, and below floorline side panels, shall be coated with rustproofing compound for which compound manufacturer has issued notarized certification of compliance to bus body builder that compound meets or exceeds all performance requirements of paragraph 3.4 of Federal Specification TT-C-5206b.

b. Undercoating compound shall be applied with suitable airless or conventional spray equipment to recommended film thickness and shall show no evidence of voids in cured film. Undercoating is expected to prevent rust under all bus service conditions for minimum of five years.

**44.3(42) *Vacuum check valve.*** Shall be provided and installed on the chassis by the school bus body manufacturer for connecting of vacuum accessory items.

**44.3(43) *Vandal lock.*** Vandal locking system on the bus is permissible in accordance with the following requirements:

a. The entrance door is to be locked by an exterior key with a dead bolt or a remote control (cable) of device. The system must prevent the door from being accidentally locked by any motion bus may encounter during its normal operation.

b. The emergency door or emergency window is to be locked by an interior slide bolt which shall activate a buzzer when the door or window is locked and the ignition of the bus is turned on to warn the driver that the emergency door is locked. The locking mechanism must be capable of being locked or unlocked without the use of a separate key or other similar device.

c. The engine starting system of the bus shall not operate if any emergency exit is locked from either the inside or outside of the bus.

**44.3(44) Ventilation.**

a. Body shall be equipped with suitable, controlled ventilating system of sufficient capacity to maintain proper quantity of air under operating conditions without opening of windows except in extremely warm weather.

EXCEPTION: Vehicles 10,000 pounds GVWR or less, supplied by chassis manufacturer.

b. Static-type, nonclosable exhaust ventilator shall be installed in low-pressure area of roof. Electrically powered roof ventilators are acceptable.

c. A combination roof ventilation and emergency escape system may be substituted for "b" above when installed by the body manufacturer. The system shall have the following design features:

(1) Multiposition fresh air ventilation.

(2) Static-type nonclosable exhaust ventilation.

(3) Release handle(s) permitting operation as an emergency exit(s), accessible inside and outside the vehicle.

(4) One unit shall be installed on vehicles of less than 53-passenger capacity.

(5) Two units shall be installed in vehicles of 53-passenger capacity and above. One unit shall be installed behind the rear axle.

**44.3(45) Wheelhousings.**

a. Wheelhouse openings shall allow for easy tire removal and service.

b. Wheelhousings shall be designed to support seat and passenger loads and shall be attached to floor sheets to prevent any dust, water, or fumes from entering the body. Wheelhousing shall be constructed of a minimum 16-gauge steel.

c. Inside height of wheelhousings above floorline shall not exceed 12 inches.

d. Wheelhousings shall provide clearance for installation and use of chains on single and dual wheels as established by National Association of Chain Manufacturers.

**44.3(46) Windshield and windows.**

a. All glass in windshield, windows, and doors shall be of approved safety glass, mounted so permanent mark is visible, and of sufficient quality to prevent distortion of view in any direction.

b. Glass in windshield may be heat absorbing and may contain a shaded band across top. Location of "fade out" shall be above upper limit for maximum visibility.

c. Glass in all side windows, doors, and rear windows shall be AS-2 or better Grade, as specified in federal requirements Z26.1-1966.

d. All full size windows are to be "split-sash" type. Minimum full side window width shall be 22 inches. The amount of window travel shall provide not less than 9 inches of unobstructed emergency opening. When driver's window consists of two sections, both sections shall be capable of being moved or opened.

All exposed edges of glass shall be banded. This prohibits single sash windows.

e. Insulated double glass is required in both sections of the left side driver's window and in the upper glass portion(s) of the service door.

EXCEPTION: Vehicles having a window glass forward of the service door and in the driver's direct line of sight for observing exterior rearview mirrors and traffic, this window glass shall be of insulated double glass.

EXCEPTION: Vehicles of 10,000 pounds GVWR or less. Equipped with a right side service door as described in 44.3(9) "a"(5) of these rules, the upper door panel(s) shall be of insulated double glass. When a driver's door is provided, door glass shall be of manufacturer's standard.

**44.3(47) Windshield washers.** Bus shall be equipped with electric wet-arm windshield washers which shall conform to the body manufacturer's recommendation as to type and size for the bus on which they are to be used.

EXCEPTION: Vehicles 10,000 pounds GVWR or less, supplied by chassis manufacturer.

**44.3(48) Windshield wipers.**

EXCEPTION: Vehicles 10,000 pounds GVWR or less, supplied by chassis manufacturer.

a. Bus shall be equipped with two positive-action, two-speed or variable-speed electric or air windshield wipers. All wipers by design and installation shall provide desirable vision for the driver and shall meet federal requirements at date of manufacture.

b. Two separate heavy-duty motors, with separate switches, shall be provided and equipped with blades of sufficient length to clear windshield glass in driver's direct view.

c. Windshield wiper blades and arms shall be heavy duty. The blades must be at least 14 inches in length.

d. All wiper controls shall be located within easy reach of the driver and designed to move blades from the driver's view when in stop position.

**44.3(49) Wiring.**

a. All wiring shall conform to current standards of the Society of Automotive Engineers and employ a system of color and number coding.

b. Circuits:

(1) The wiring shall be arranged and relays added where appropriate, in at least nine regular circuits, as follows:

Head, tail, clearance, identification, instrument panel and stepwell lamps shall come on with head-lights. This circuit cannot be subdivided (stepwell lamp shall be activated when service door is opened);

Dome lamps;

Starter motor;

Ignition and emergency door signal;

Turn signal lamps;

Alternately flashing warning signal lamps;

Horn;

Heaters, defrosters; and

Stop (brake).

(2) Unless otherwise noted, all of the above combination circuits may be subdivided into additional independent circuits.

(3) Whenever possible, all other electrical functions (sanders and electric windshield wipers) shall be provided with independent and properly protected circuits.

(4) Each body circuit shall be coded by number and letter on a diagram of the circuits and shall be attached to the body in a readily accessible location.

c. A separate fuse or circuit breaker shall be provided for each circuit except starter motor and ignition circuits.

d. All wires within the body shall be insulated and protected by a covering of fibrous loom (or equivalent) which will protect them from external damage and minimize dangers from short circuits. Whenever wires pass through a body member, additional protection in the form of an appropriate type of insert shall be provided.

e. The entire electrical system of the body shall be designed for the same voltage as the chassis on which the body is mounted.

f. All wiring shall have an amperage capacity equal to or exceeding the designed load. All wiring splices to be done at an accessible location and noted as splices on wiring diagram.

g. A body wiring diagram of easily read size shall be furnished with each bus body or affixed in an area convenient to the electrical accessory control panel.

h. Body power wire shall be attached to special terminal on the chassis.

i. All wires passing through metal openings shall be protected by a grommet.

j. Wires not enclosed within body shall be fastened securely at intervals of not more than 18 inches. All joints shall be soldered or joined by equally effective connectors.

**281—44.4(285) Construction of vehicles for children with mobility problems.** The following shall apply to vehicles constructed for the transportation of children with mobility problems of such severity that prohibit them from utilizing the regular service door entrance. Vehicles constructed for transporting these children shall meet all federal motor vehicle safety standards relating to school bus construction and Iowa school bus construction requirements as described in rules 281—44.2(285) and 281—44.3(285). The following standards shall also apply:

**44.4(1) General requirements.**

a. Certification of these vehicles as a multipurpose passenger vehicle due to capacity rating shall not relieve the manufacturer of the responsibility to provide a completed vehicle meeting all federal motor vehicle safety standards for school buses as well as rules 281—44.1(285) to 281—44.3(285) relating to the construction of a school bus.

b. Alteration of the interior of the vehicle is permissible if all seats and barriers, component parts, anchorages, wheelchair securement devices, and placement of seats and barriers and wheelchair securement devices comply with federal requirements as of date of manufacture. All equipment must be supplied by the original manufacturer and installed per the original manufacturer's specification. Alteration which would return the vehicle to conventional passenger seating (removal of all wheelchair securement devices) shall include removal of the power lift and rendering the special service door inoperable.

c. Any school bus that is used for the transportation of children who are confined to a wheelchair or other restraining devices which prohibit use of the regular service entrance shall be equipped with a power lift located on the right side of the bus body and forward of the rear wheels. (See paragraph 44.4(2) "g.")

d. The actual rated seating capacity following modification of a vehicle shall be placed at locations indicated in subrule 44.3(17).

e. Ramps are not permitted.

**44.4(2) Specific requirements.**

a. Aisle.

(1) Aisles leading from wheelchair placement(s) to special service door and service door shall at all times be wide enough to permit passage of a wheelchair.

(2) Aisles leading to the emergency door from wheelchair placement(s) shall at all times be of at least 20 inches in width.

b. Barriers.

(1) Barriers shall comply with and be installed as required by federal standards as of date of manufacture.

(2) A heavy-duty padded barrier or stanchion shall be provided immediately to the rear of the stepwell opening extending from the side wall of the bus to approximately the aisle to prevent a person from accidentally falling into the stepwell opening from floor level. A barrier or stanchion as mentioned above shall also be placed directly behind the driver.

(3) The power lift mechanism shall be padded and adequately protected to prevent a child from accidentally getting any part of their body caught in the power lift mechanism or special service door at any time.

(4) In the event that an elevator (body floor section serving as lift platform) lift is used, both forward and rear side of platform shall be protected with heavy-duty padded barriers extending from the wall of the body toward the aisle. A covered chain shall be fastened to the rear barrier adjacent to the lift platform, extend across the platform opening, and attach with hook and eye to the forward barrier adjacent to the lift platform.

c. Glazing. Tinted glazing may be installed in all doors, windows, and windshield.

d. Heaters. An additional heater(s) may be installed in the rear portion of the bus on or behind wheel wells.

e. Identification. Buses with wheelchair lifts used for transporting physically handicapped children may display universal handicapped symbols located on the front and rear of the vehicle below the windowline. Emblems shall be white on blue, shall not exceed 12 square inches in size, and may be reflectorized.

f. Power lift.

(1) Lifting mechanism shall be able to lift minimum payload of 800 pounds.

(2) Power lift shall be located on the right side of the body and in no way be attached to the exterior sides of the bus, but should be confined within the perimeter of the school bus body when not extended. It shall be located forward of the rear wheels of the vehicle.

(3) When the platform is in the fully up position, it shall be locked in position mechanically by means other than a support or lug in the door.

(4) All lift controls shall be portable and conveniently located on the inside of the bus near the top of the special service door opening. Controls shall be easily operable from inside or outside the bus by either a platform standee or person seated in a wheelchair when the lift is in any position. A master cut-off switch shall be located in the driver's compartment. There shall be a means of preventing the lift platform from falling while in operation due to a power failure.

(5) Power lifts shall be equipped so they may be manually raised or lowered in the event of power failure of the power lift mechanism.

(6) The platform shall accommodate a wheelchair which is 30 inches wide. The platform shall be not less than 44 inches long, including guard panels or rails.

(7) The power lift platform shall be covered with skid-resistant material or be designed to prevent slipping.

(8) The lift platform shall be constructed to permit vision through that portion of the platform covering the window of the special service door when the platform is in the "up" position.

(9) All edges of the platform shall be designed to restrain wheelchair and to prevent operator's feet from being entangled during the raising and lowering process.

(10) Platform shall be fitted on both sides with full width shields which extend above the floorline of the lift platform.

(11) An inward operating safety barrier shall be affixed to the outer edge (curb end) of the platform that will prohibit the wheelchair from rolling off the platform when the lift is in any position other than fully extended to ground level. The barrier shall not be capable of being manually operated.

(12) A self-adjusting, skid-resistant plate shall be installed on the outer edge of the platform to minimize the incline from the lift platform to the ground level. This plate, if so designed, may also suffice as the restraining device described in subparagraph 11 above.

(13) The power lift shall be designed so the lift will not operate unless the special service door(s) is opened and the lift platform is in the down or horizontal position.

(14) The lift travel shall allow the lift platform to rest securely on the ground.

(15) A circuit breaker or fuse shall be installed between power source and lift motor if electrical power is used.

(16) When hydraulic pressure is used in the lifting process, the system shall be equipped with adjustable limit switches or bypass valves to prevent excessive pressure from building in the hydraulic system when the platform reaches the full up position or full down position.

(17) All exposed parts of the power lift which are in direct line with the forward or rearward travel of a wheelchair student or attendant shall be padded with energy-absorbing material.

g. Ramps. (Not permitted.)

h. Regular service entrance. An additional fold-out or slide-out step may be provided which will provide for the step level to be no more than 6 inches from the ground level to assist persons with handicapping conditions which prohibit use of the standard entrance step. This step, when stored and not in use, shall not impede or in any way block the entrance from normal use.

i. Seating and seating arrangements.

(1) All seat spacing, seats, and related components shall comply with applicable federal standards as of date of manufacture.

(2) All seats shall be forward facing. Side-facing seats are prohibited.

(3) Seat frames may be equipped by the school bus body manufacturer with rings or other devices to which passenger restraint systems may be attached.

j. Special light. Light(s) shall be placed inside the bus to sufficiently illuminate lift area and shall be activated from the door area.

k. Special service opening.

(1) There shall be an enclosed service opening located on the right side (curb side) of the body forward of rear wheels to accommodate a wheelchair lift.

(2) The opening shall be at least 52 inches high and 40 inches wide and with doors open shall be of sufficient width to allow for the installation of various power lifts and related accessories as well as a lifting platform at least 32 inches wide.

(3) The opening shall be positioned far enough to the rear of the regular service door opening to prevent interference of the special service door(s) opening with the regular service doors.

(4) The opening may extend below the floor through the bottom of the body skirt. If an opening is used, reinforcements shall be installed at the front and rear of the floor opening to support the floor and give the same strength as other floor openings.

(5) A drip molding shall be installed above the opening to effectively divert water from the entrance.

(6) Door posts, headers, and all floor sections around this special opening shall be reinforced to provide strength and support equivalent to adjacent side wall and floor construction of an unaltered model.

(7) A header pad at least 3 inches wide, extending the width of special service door, shall be placed above the opening on the inside of the bus.

l. Special service door(s).

(1) A single door may be used if the width of the door opening does not exceed 42 inches. Two doors shall be used where door opening exceeds 42 inches.

(2) All doors shall open outwardly.

(3) All doors shall have positive fastening devices to hold doors in the open position.

(4) All doors shall be equipped with heavy-duty hinges and hinged to the side of the bus.

(5) All doors shall be weather sealed; and on buses with double doors, they shall be of the same size and constructed so a flange on the forward door overlaps the edge of the rear door when closed.

(6) If optional power doors are installed, the design shall permit release of the doors for opening and closing by the attendant from the platform inside the bus.

(7) When manually operated dual doors are provided, the rear door shall have at least a one-point fastening device to the header. The forward-mounted door shall have at least three-point fastening devices. One shall be to the header, one to the floor line of the body, and the other shall be into the rear door. These locking devices shall afford maximum safety when the doors are in the closed position. The door and hinge mechanism shall be of a strength that will provide the same type of use as that of a standard entrance door.

(8) If the door is made of one-piece construction, the door shall be equipped with a slidebar, cam-operated locking device.

(9) Each door shall have installed a safety glass window, set in rubber, and aligned with the lower line of adjacent sash and as nearly as practical to the same size as other bus windows.

(10) Door materials, panels, and structural strength shall be equivalent to the conventional service and emergency doors. Color, rub rail extensions, lettering, and other exterior features shall match adjacent sections of the body.

(11) The door(s) shall be equipped with a device(s) that will actuate a flashing visible signal located in the driver's compartment when door(s) is not securely closed. (Audible signal not permitted.)

m. Special student restraining devices.

(1) Wheelchairs shall be equipped with an appropriate passenger restraint system.

(2) Special restraining devices such as shoulder harnesses, lap belts, and chest restraint systems may be installed to the seats providing that the devices do not require the alteration in any form of the school bus seat, seat cushion, framework, or related seat components. These restraints must be for the sole purpose of restraining handicapped students.

*n. Wheelchair securement systems.*

(1) Securement systems for wheelchairs shall be those approved by the bureau of school administration and accreditation, Iowa department of education.

(2) All wheelchair securement systems or devices shall be placed in the vehicle so when secured both wheelchair and occupant are facing toward the front of the vehicle. Fastening devices resulting in a side-facing wheelchair and occupant are not permissible.

(3) Wheelchair securement systems or devices shall be provided and attached to the floor of the vehicle with Grade "5" or better bolts and self-locking nuts or lock washers and nuts. The devices must be of the type that require human intervention to unlatch or disengage.

(4) The securement system must be designed to withstand forces up to 2,000 pounds per tiedown leg or clamping mechanism or 4,000 pounds total for each wheelchair, whichever is the lesser of the two.

(5) Straps or seat-belt devices running through the wheels of the wheelchair or around the student seated in the wheelchair for the purpose of securing the wheelchair to the floor are not acceptable.

(6) When wheelchair securement system(s) is located in a school bus so when a wheelchair is not secured in place the device(s) may create a tripping hazard for school bus drivers, passengers, or attendants, the fastening device(s) shall not extend above the floor level more than ½ inch.

## **281—44.5(285) Family-type or multipurpose passenger vehicles.**

**44.5(1) General information.** These vehicles may be used as a school bus in accordance with the following general requirements:

*a.* The vehicle shall be an original equipment manufacturer's (OEM) product and manufactured as a family-type or multipurpose passenger vehicle.

*b.* The manufacturer's rated capacity of this vehicle shall not exceed nine persons including the driver and shall be determined only by the original equipment manufacturer (OEM) on the date of manufacture. The capacity rating may not be changed or modified except by the original equipment manufacturer. Secondary stage or vehicle conversion manufacturers shall not establish vehicle capacity.

*c.* Alteration of this vehicle, following manufacture by the original equipment manufacturer (OEM), is prohibited. This includes but is not limited to the addition or deletion of seats, ramps, wheelchair securement devices and power lifts. See rule 281—44.4(285).

EXCEPTION: The addition or installation of original equipment manufacturer (OEM) options or other manufacturer's accessories not in violation of these standards may be installed.

*d.* The vehicle shall not carry more passengers than there are seat belts as installed by the manufacturer.

*e.* The vehicle shall be painted a color other than National School Bus Glossy Yellow.

*f.* The vehicle shall not be equipped with a stop arm or flashing warning signal lamps.

*g.* This vehicle must load or unload students off the traveled portion of the roadway.

### **44.5(2) Special equipment.**

*a.* Interior liner. An interior liner must be provided and installed by the manufacturer that covers all exposed ceiling girders, sidewall posts, or other structural projections.

*b.* "SCHOOL BUS" sign. While transporting children to and from schools the vehicle shall be equipped with temporary sign(s) visible to the front and rear displaying the words "SCHOOL BUS." The sign(s) shall be painted National School Bus Glossy Yellow in color with black letters 6 inches high. The sign(s) shall be of a type that can be dismantled, turned down or covered when the vehicle is not transporting pupils to and from school.

c. Special sign. A sign with the words, “THIS VEHICLE STOPS AT ALL RAILROAD CROSSINGS,” visible to the rear may be used; however, it is not required. If used, the words shall be painted in black letters on a yellow background. The sign shall be of a type that can be dismounted, turned down, or covered when the vehicle is not transporting pupils to and from school.

d. Special brake lamps. The vehicle may be equipped with two roof mounted lights not greater than 4 inches in diameter and positioned horizontally on the roof at least 36 inches apart. The lights shall be connected to the brake lamp circuit of the vehicle’s electrical system and shall operate only when the brakes are applied. When lit, the lamps shall be visible only to the rear and be red in color.

e. First-aid kit. The vehicle shall carry a ten-unit first-aid kit. See subrule 44.3(12).

f. Fire extinguisher. The vehicle shall carry a dry chemical fire extinguisher of at least 2½-pound capacity with a rating of 2A-10BC. The extinguisher shall be equipped with a calibrated or marked gauge. Plastic discharge heads and related parts are not acceptable.

**44.5(3) *Applicability of standards.*** The above standards apply to all new vehicles of this type and those currently in service and used to transport students to and from school.

These rules are intended to implement Iowa Code section 285.8.

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## CHAPTER 45

Reserved